

Claims

- [c1] 7 .A lamp comprising:
- an optical module including a plurality of LEDs for emitting light and a heat sink thermally coupled to the LEDs, the heat sink having an electrical conduit for transmitting conditioned electrical power to the LEDs; and
 - an electronics module including an input electrical interface adapted to receive input electrical power and an output coupler rigidly attaching to the optical module for delivering conditioned electrical power to the electrical conduit, the electronics module further including electrical conditioning circuitry for electrically coupling the input electrical interface to the output coupler.
- [c2] 2 .The lamp as set forth in claim 7 , further including:
- a second electronics module including a second input electrical interface adapted to receive second input electrical power and an output coupler identical to the output coupler of the electronics module, the second electronics module further including second electrical conditioning circuitry for electrically coupling the input electrical interface to the output coupler;
 - wherein each of the electronics module and the second electronics module are selectably detachably attachable to the optical module for selectably adapting the optical module to one of the input electrical power and the second input electrical power.
- [c3] 3 .The lamp as set forth in claim 7 , further including:
- a circuit board in thermal contact with the heat sink and on which the plurality of LEDs are arranged, the circuit board including electrical traces for electrically interconnecting the LEDs.
- [c4] 4 .The lamp as set forth in claim 7 , wherein the electrical interface includes one of an Edison-type base and a GU-type base.
- [c5] 5 .The lamp as set forth in claim 7 , wherein the electronics module further includes:
- an electronic controller for controlling at least an LED intensity.
- [c6] 6 .The lamp as set forth in claim 5 , wherein the electronic controller includes

one of:

- a DMX network protocol controller;
- a CAN network protocol controller; and
- a PDA network protocol controller.

- [c7] 7.The lamp as set forth in claim 1 , wherein the plurality of LEDs include:
- a first LED that emits light of a first color;
 - a second LED that emits light of a second color; and
 - a third LED that emits light of a third color.
- [c8] 8.The lamp as set forth in claim 7 , wherein the electronics module further includes:
- a controller for selectively controlling electrical power applied to the first, second, and third LED to effectuate color control.
- [c9] 9.The lamp as set forth in claim 1 , wherein the optical module further includes:
- an optical system arranged to cooperate with the LEDs to produce a light beam having a selected beam spread.
- [c10] 10.The lamp as set forth in claim 9 , wherein the optical system includes a plurality of lenses corresponding to the plurality of LEDs.
- [c11] 11.The lamp as set forth in claim 1 , wherein the output coupler of the electronics module is adapted to thermally communicate with the heat sink of the optical module.
- [c12] 12.An apparatus for connecting an associated lamp to an associated electrical power supply, the associated lamp having one or more light emitting diodes (LEDs) and a first coupling element adapted to convey conditioned electrical power to the LEDs, the apparatus comprising:
- an input electrical interface adapted to operatively connect to the associated electrical power supply to receive input electrical power;
 - a second coupling element adapted to cooperate with the first coupling element to selectively detachably connect the optical module and the apparatus together, the second coupling element adapted to electrically connect with the

first coupling element to transmit conditioned electrical power to the first coupling element; and
electrical conditioning circuitry connecting the input electrical interface with the second coupling element that converts the input electrical power at the input electrical interface to conditioned electrical power at the second coupling element.

- [c13] 13. The apparatus as set forth in claim 12, further including:
a controller in communication with the electrical conditioning circuitry for selectively controlling power supplied to the LEDs.
- [c14] 14. A light emitting apparatus comprising:
a heat sink having a first side, a second side, and a conduit connecting the first side and the second side, wherein the second side is adapted to connect with any one of an associated plurality of electrical adaptors each adapted to convert a selected electrical input power to a conditioned output electrical power; and
a plurality of light emitting diodes disposed at the first side of the heat sink and in thermal communication therewith, the light emitting diodes receiving the conditioned electrical power from the selected adaptor via the conduit.
- [c15] 15. The light emitting apparatus as set forth in claim 14, further including:
a pc board on which the plurality of light emitting diodes are arranged, the pc board disposed at the first side of the heat sink and in thermal communication therewith.
16. The light emitting apparatus as set forth in claim 15, further including:
thermal tape bonding the pc board to the first side.
- [c16] 17. The light emitting apparatus as set forth in claim 14, wherein the second side of the heat sink is adapted to detachably connect with any one of the associated plurality of electrical adaptors.
- [c17] 18. The light emitting apparatus as set forth in claim 14, wherein the heat sink thermally communicates with the associated electrical adaptor connected at the second side to provide heat sinking for the adaptor.
- [c18] 19. A method for retro-fitting a lamp fixture configured to receive an MR- or

PAR-type lamp in an electrical receptacle with an LED-based lamp, the method comprising:

selecting an LED-based lamp conforming at least to a diameter of the MR- or PAR-type lamp;

selecting a connector module conforming with the electrical receptacle of the lamp fixture; and

mechanically joining the selected LED-based lamp and the selected connector module to form an LED-based retro-fit unit, the mechanical joining effectuating electrical connection therebetween.

[c19] 20 .The retro-fitting method as set forth in claim 19 , further including:
installing the LED-based retro-fit unit in the lamp fixture, the installing including connecting the connector module to the electrical receptacle of the lamp fixture.

[c20] 21 .The retro-fitting method as set forth in claim 19 , wherein the mechanical joining includes:
detachably attaching the selected LED-based lamp and the selected connector module to form the LED-based retro-fit unit.

[c21] 22 .A lamp comprising:
an optics module having:
a plurality of LEDs arranged on a printed circuit board, and
a heat sink having an electrical conduit for conveying electrical power through the heat sink, the plurality of LEDs thermally communicating with the heat sink;
and
an electronics module adapted to convey power to the plurality of LEDs via the electrical conduit of the heat sink, the electronics module having a first end adapted to connect with the heat sink and a selected electrical connector arranged on a second end for receiving electrical power, the electronics module housing circuitry arranged within for adapting the received electrical power to drive the LEDs.

[c22] 23 .The lamp as set forth in claim 22 , wherein the optics module further includes:

a lens system comprising at least one lens arranged to receive light generated by the LEDs for modifying a characteristic of the light.

[c23] 24 .The lamp as set forth in claim 23 , wherein the lens system further includes: an adjustment for selectively adjusting a separation between the at least one lens and the plurality of LEDs.

[c24] 25 .The lamp as set forth in claim 22 , wherein the optics module further includes:
a thermal tape disposed between the printed circuit board and the heat sink for providing thermal contact therebetween.

[c25] 26 .The lamp as set forth in claim 22 , wherein the heat sink thermally communicates with the electronics module to heat sink the electronics module.